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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.      | CONFIRMATION NO. |
|---|-------------|----------------------|--------------------------|------------------|
| 10/790,550  | 03/01/2004  | Dureseti Chidambarao | FIS920030388US1          | 9708             |
| 7590  | 11/08/2005  |                      |                          |                  |
| Graham S. Jones, II<br>42 Barnard Avenue<br>Poughkeepsie, NY 12601-5023 |             |                      | EXAMINER<br>DANG, PHUC T |                  |
|   |             |                      | ART UNIT<br>2818         | PAPER NUMBER     |

DATE MAILED: 11/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/790,550             | CHIDAMBARRAO ET AL. |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | PHUC T. DANG           | 2818                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on election filed on September 22, 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 14 is/are rejected.
- 7) ☒ Claim(s) 2-13 and 15-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>030104</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

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### **DETAILED ACTION**

1. Applicant's election with traverse of Group I (claims 1-13) has been acknowledged.

The traversal is found persuasive and the restriction has been withdrawn.

Claims 1-20 are currently pending in the application.

### **Oath/Declaration**

2. The oath/declaration filed on March 1, 2004 is acceptable.

### **Information Disclosure Statement**

3. The office acknowledges receipt of the following items from the applicant:

Information Disclosure Statement (IDS) filed on March 1, 2004.

### **Claim Rejections-35 USC § 112**

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the application regards as his invention.

4. Claim 20 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

In claim 5, a term "... the sacrificial layer is composed of SiGe" lacks antecedent basis since Applicants did not mention a sacrificial layer in the independent method claim 14? Applicant should clarify this limitation in the drawings.

### **Claim Rejections - 35 USC § 103**

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krivokapic et al., hereinafter "Krivokapic" (Publication No. US 2004/0197975 A1).

Regarding claim 1, Krivokapic discloses a method of forming a MOSFET device comprising:

forming a semiconductor structure comprising a source region 310, a drain region 320 over a horizontal surface of a substrate 110 comprising an insulating material 120;

forming a channel structure over the horizontal surface of the substrate 110 connecting between the drain region 310 and the source region 320, with the channel structure comprising a horizontal semiconductor channel fin above a vertical fin 1610 with the planar fin 1620, the vertical fin 1610 having a proximal edge and a distal edge, with the proximal edge in contact with the horizontal surface of the substrate 110 and with the planar fin 1620 in contact with the distal edge of the vertical fin 1610 [Figs. 7, 9-10 and 16-18];

forming a gate dielectric layer 1612 over exposed surfaces of the channel structure 1600; and

forming a gate electrode 1801 straddling the channel gate dielectric 1612 and the channel structure 1600 [Figs. 1-18].

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Krivokapic discloses all the features of the claimed invention as discussed above, but does not disclose the vertical fin has a T-shaped cross-section as claimed in the claim 1. However, in Figs. 7-9 and 16, Krivokapic depicts a T-shaped cross-section of a vertical fin 1610 similar as claimed in the invention. Therefore, claim 1 is obviously rendered over Krivokapic.

Regarding claim 14, Krivokapic discloses a narrow fin FINFET comprising:

- a semiconductor structure comprising a source region 310, a drain region 320 over a horizontal surface of a substrate 110 comprising an insulating material 120;

- a channel structure over the horizontal surface of the substrate 110 connecting between the drain region 310 and the source region 320, with the channel structure comprising a horizontal semiconductor channel fin above a vertical fin 1610 with the planar fin 1620, the vertical fin 1610 having a proximal edge and a distal edge, with the proximal edge in contact with the horizontal surface of the substrate 110 and with the planar fin 1620 in contact with the distal edge of the vertical fin 1610 [Figs. 7, 9-10 and 16-18];

- a gate dielectric layer 1612 over exposed surfaces of the channel structure 1600; and

- a gate electrode 1801 straddling the channel gate dielectric 1612 and the channel structure 1600.

Krivokapic discloses all the features of the claimed invention as discussed above, but does not disclose the vertical fin has a T-shaped cross-section as claimed in the claim 14. However, in Figs. 7-9 and 16, Krivokapic depicts a T-shaped cross-section of a vertical fin 1610 similar as claimed in the invention. Therefore, claim 14 is obviously rendered over Krivokapic.

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### **Allowable Subject Matter**

6. The following is a statement of reason for the indication of allowable subject matter:

Claims 2-13 and 15-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

None of the prior art made of record does not disclose the channel structure comprises a vertical fin and a planar fin both composed of semiconductor material as cited in claims 2, 15 and 17-18 and the channel structure comprises a vertical fin composed of an insulating material and a planar fin composed of semiconductor material as cited in claims 3, 16 and 19 and a method including the steps as follows forming a sacrificial layer over the horizontal surface of the substrate prior to forming the channel structure; forming a patterned window extending through the sacrificial layer down to the horizontal surface of the substrate for shaping the vertical fin of the channel structure; depositing a semiconductor layer filling the patterned window to form the vertical fin of the channel structure and forming a blanket semiconductor layer covering the sacrificial layer; forming a channel mask over the blanket semiconductor layer aligned with the vertical fin of the channel structure; etching away portions of the blanket semiconductor layer aside from the channel mask to form the planar fin; whereby the channel structure comprises a vertical fin and a planar fin as cited in claims 4 and 9.

Claims 5-8 and 10-13 are depend on claims 4 and 9, then, they also would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

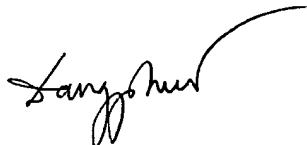
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### Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Blackburn'737 and Unvala'361 are cited interest.
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.
9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.
10. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PP



Primary Examiner

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